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EXAMINER	
KENERLY, TERRANCE L	

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2834	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/593,611	TREMAUDANT ET AL.	
	Examiner	Art Unit	
	TERRANCE KENERLY	4113	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 17 February 2009.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-15 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-15 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 21 September 2006 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 1-6 and 10-12 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Schroeder et al. (5,844,339) in view of Garvey (USPGPub2004/0021381 A1).

As to **claim 1**, Schroeder et al. discloses an active magnetic bearing with auto-detection of position, the bearing comprising at least first and second opposing electromagnets forming stators disposed on either side of a ferromagnetic body forming a rotor and held without contact between said electromagnets, the first and second electromagnets each comprising a magnetic circuit essentially constituted by a first ferromagnetic material and co-operating with said ferromagnetic body to define an air gap, together with an excitation coil powered from a power amplifier whose input current is servo-controlled as a function of the position of the ferromagnetic body relative to the magnetic circuits of the first and second electromagnets, the position of the ferromagnetic body being measured from the inductance detected between the two electromagnets in response to simultaneous injection into both opposing

electromagnets of a sinusoidal current at a frequency that is greater than the closed loop pass band of the system (see claim 1 Schroeder et al.).

Schroeder et al. teaches all of the limitations of claim except for the bearing being characterized in that the magnetic circuit of each electromagnet further includes a portion in the vicinity of the excitation coil that uses a second ferromagnetic material having magnetic permeability that is lower than that of the first material and electrical resistivity that is higher than that of the first material so as to encourage the passage of the high frequency magnetic fields that are generated in the bearing.

Garvey discloses that in preferred embodiments of the invention, materials of different magnetic permeabilities and resistivities are distributed within the bearing elements to help guide a magnetic flux pattern in the bearing unit (see Garvey paragraph 0042).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made, to modify the bearing of Schroeder et al. with sections of differing magnetic permeabilities and resistivities around the excitation coil, as taught by Garvey, so as to guide the magnetic frequencies in the desired pattern.

As to **claim 2**, Schroeder et al. teaches all of the limitations of claim 2 except how the magnetic permeability and the electric resistivity characterize the bearing. Garvey discloses several methods of constructing the interleaving components of a magnetic bearing (see Garvey col 8 line 63). The two main methods are using laminated steel and the use of powder metallurgy composites having high resistivity. It is also known that powder metallurgy is the lesser expensive of the two. Therefore, it

would have been obvious to a person having ordinary skill in the art at the time the invention was made, to use a powder metallurgy in view of Garvey, so as to reduce the cost of fabrication.

As to **claim 3**, Schroeder et al. teaches all of the limitations of claim 3 except how the powder forming the low permeability and high resistivity region of the bearing is characterized. Garvey discloses several methods of constructing the interleaving components of a magnetic bearing. The two main methods are using laminated steel and the use of powder metallurgy composites having high resistivity (see Garvey col 8 line 63). It is also known that powder metallurgy is the lesser expensive of the two processes. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made, to use a powder metallurgy in view of Garvey so as to reduce the cost of fabrication.

As to **claim 4**, Schroeder et al. teaches all of the limitations of claim 4 except how the rotor forming portion of the bearing is characterized. Garvey discloses that in preferred embodiments of his invention, materials of different magnetic permeabilities and resistivities are distributed within the bearing elements help guide a magnetic flux or field pattern in the bearing unit (see Garvey paragraph 0042). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made, to modify the Schroeder et al. and Garvey bearing with varying thickness of the ferromagnetic laminations as taught by Garvey, so as to guide the magnetic frequencies in the desired pattern.

As to **claim 5**, Schroeder et al. teaches all of the limitations of claim 5 except how the low permeability and high resistivity portion of the rotor is characterized. Garvey discloses several methods of constructing the interleaving components of a magnetic bearing. The two main methods are using laminated steel and the use of powder metallurgy composites having high resistivity. It is also known that powder metallurgy is the lesser expensive of the two processes. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made, to use a powder metallurgy in view of Garvey so as to reduce the cost of fabrication.

As to **claim 6**, Schroeder et al. teaches all of the limitations of claim 6 except how the bearing is characterized (see Schroeder et al. claim 1). Garvey discloses that in preferred embodiments of the invention, materials of different magnetic permeabilities and resistivities are distributed within the bearing elements help guide a magnetic flux or field pattern in the bearing unit (see Garvey paragraph 0042). It is also known that powder metallurgy is the lesser expensive of the two processes. Therefore, it would be obvious to a person having ordinary skill in the art, to modify the bearing of Schroeder et al. with sections of differing magnetic permeabilities and resistivities as taught by Garvey, so as to guide the magnetic frequencies in the desired pattern.

As to **claim 10**, Schroeder et al. teaches that the active magnetic bearing is of the axial or radial type but fails to teach how the magnetic permeability and the electric resistivity characterize the bearing (see Schroeder et al. col 7 lines 31-35 and 37-40). Garvey discloses that in preferred embodiments of the invention, materials of different

magnetic permeabilities and resistivities are distributed within the bearing elements help guide a magnetic flux pattern in the bearing unit (see Garvey paragraph 0042). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made, to modify the bearing of Schroeder et al. with sections of differing magnetic permeabilities and resistivities, in view of Garvey, so as to guide the magnetic frequencies in the desired pattern.

As to **claim 11**, Schroeder et al. teaches that active magnetic bearing is of the axial or radial type but fails to teach how the magnetic permeability and the electric resistivity characterize the bearing (see Schroeder et al. col 7 lines 31-35 and 37-40). Garvey discloses that in preferred embodiments of the invention, materials of different magnetic permeabilities and resistivities are distributed within the bearing elements help guide a magnetic flux pattern in the bearing unit (see Garvey paragraph 0042). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made, to modify the bearing of Schroeder et al. with sections of differing magnetic permeabilities and resistivities, in view of Garvey, so as to guide the magnetic frequencies in the desired pattern.

As to **claim 12**, Schroeder et al. teaches all of the limitations of claim 12 except how the low permeability high resistivity portion of the rotor is formed. Garvey discloses that in preferred embodiments of the invention, materials of different magnetic permeabilities and resistivities are distributed within the bearing elements help guide a magnetic flux pattern in the bearing unit (see Garvey paragraph 0042). Therefore, it would have been obvious to a person having ordinary skill in the art at the

time the invention was made, to modify the rotor of the Schroeder et al. and Garvey bearing with varying thickness of the ferromagnetic laminations that are made using a powder metallurgy technique, so as to reduce the cost of fabrication and guide the magnetic flux or field in the desired pattern.

Claim 7 is rejected under 35 U.S.C. 103 (a) as being unpatentable over Schroeder et al. (5,844,339) and Garvey (USPGPub2004/0021381 A1) as applied to claim 4 above, and further in view of Meeks (5,216,308).

As to **claim 7**, Schroeder et al. teaches all of the limitations of claim 7 except how the low permeability high resistivity portion of the rotor is formed and how the interleaving components of the bearing are formed and at what magnetic permeability or electric resistivity. Schroeder et al. also fails to teach how the powder forming the low permeability and high resistivity region of the bearing is characterized. Garvey discloses that in preferred embodiments of the invention, materials of different magnetic permeabilities and resistivities are distributed within the bearing elements help guide a magnetic flux pattern in the bearing unit (see Garvey paragraph 0042). Meeks discloses an active magnetic bearing with a portion of the rotor formed with ferromagnetic laminations (see Meeks col 7 line 7). Although the laminated stacks in Meeks active bearing are formed of high permeability, the stacks could be formed of ferromagnetic materials of low permeability (see Garvey paragraph 0042). Also by forming the portion of the rotor with varying thickness of the ferromagnetic laminations

would also create a desired flux or field pattern (see Garvey paragraph 0042). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made, to modify the rotor of the Schroeder et al. and Garvey bearing with varying thickness of the ferromagnetic laminations as taught by and Meeks, so as to guide the magnetic frequencies in the desired pattern.

Claim 8 and 13 is rejected under 35 U.S.C. 103 (a) as being unpatentable over Schroeder et al. (5,844,339) and Garvey (USPGPub2004/0021381 A1) as applied to claims 1 and 4 above, and further in view of Clark (5,289,066).

As to **claim 8**, Schroeder et al. teaches all of the limitations of claim 8 except how the low permeability of the portion is characterized as far as permeability. Garvey discloses that in preferred embodiments of his invention, materials of different magnetic permeabilities and resistivities are distributed within the bearing elements help guide a magnetic flux pattern in the bearing unit (see Garvey paragraph 0042). Clark discloses that all soft magnetic materials should have a magnetic permeability of higher than 50 and it is preferred to have this permeability to be of the range of 100 – 1000 (see Clark col 7 line 30). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made, to modify the bearing of Schroeder et al., with a magnetic permeability of 100, in view of Garvey and Clark so as to improve upon the effectiveness of passing high frequency magnetic fields.

As to **claim 13**, Schroeder et al. teaches all of the limitations of claim 13 except how the low permeability and high resistivity region of the bearing is characterized as far as permeability (see Schroeder et al. claim 1). Clark discloses that all soft magnetic materials should have a magnetic permeability of higher than 50 and it is preferred to have this permeability to be of the range of 100 – 1000 (see Clark col 7 line 30). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the bearing of Schroeder et al. with a magnetic permeability of 100, in view of Garvey and Clark so as to improve upon the effectiveness of passing high frequency magnetic fields.

Claim 9 is rejected under 35 U.S.C. 103 (a) as being unpatentable over Schroeder et al. (5,844,339) and Garvey (USPGPub2004/0021381 A1) as applied to claim 1 above, and further in view of SKF "Hybrid bearings for electrical machinery" (herein after SKF).

As to **claim 9**, Schroeder et al. teaches all of the limitations of claim how the low permeability and high resistivity portions of the bearing are characterized by a resistivity of 50 ohm meters. Garvey discloses that in preferred embodiments of his invention, materials of different magnetic permeabilities and resistivities are distributed within the bearing elements help guide a magnetic flux pattern in the bearing unit (see Garvey paragraph 0042). SKF discloses a hybrid bearing and how its electric resistivity is important to reduce "bearing arc flash damage" (see SKF col 1). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention

was made to modify the bearing of Schroeder et al. with a resistivity of 50 ohm meters, in view of Garvey and SKF so as to reduce arc flash damage.

Claim 14 and 15 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Schroeder et al. (5,844,339), Garvey (USPGPub2004/0021381 A1) and Meeks (5,216,308) as applied to claim 7 above, and further in view of SKF and Clark (5,289,066).

As to **claim 14**, Schroeder et al. teaches all of the limitations of claim 14 except how the high resistivity portion of the bearing is characterized by a resistivity of 100 ohm meters, how low permeability of the portion is characterized, how the low permeability high resistivity portion of the rotor is formed, and how the interleaving components of the bearing are formed and at what magnetic permeability or electric resistivity (see Schroeder et al. col 7 lines 37-40). SKF discloses a hybrid bearing and how its electric resistivity is important to reduce “bearing arc flash damage” (see SKF col 1). Clark discloses that all soft magnetic materials should have a magnetic permeability of higher than 50 and it is preferred to have this permeability to be of the range of 100 – 1000 (see Clark col 7 line 30). Meeks discloses an active magnetic bearing with a portion of the rotor formed with ferromagnetic laminations (see Meeks col 7 line 7). Garvey discloses that in preferred embodiments of his invention, materials of different magnetic permeabilities and resistivities are distributed within the bearing elements help guide a magnetic flux pattern in the bearing unit (see Garvey paragraph 0042). Therefore, it would have been obvious to a person having ordinary

skill in the art at the time of the invention to modify the bearing of Schroeder et al. with a resistivity of 50 ohm meters and a magnetic permeability of 100, in view of Garvey, Meeks, Clark, and SKF, so as to reduce arc flash damage and to improve upon the passing of high frequency magnetic fields through various parts of the bearing.

As to **claim 15**, Schroeder et al. teaches all of the limitations of claim 15 except how the high resistivity portion of the bearing is characterized by a resistivity of 100 ohm meters, how low permeability of the portion is characterized, how the low permeability high resistivity portion of the rotor is formed, and how the interleaving components of the bearing are formed and at what magnetic permeability or electric resistivity (see Schroeder et al. col 7 lines 31-35). SKF discloses a hybrid bearing and how its electric resistivity is important to reduce "bearing arc flash damage" (see SKF col 1). Clark discloses that all soft magnetic materials should have a magnetic permeability of higher than 50 and it is preferred to have this permeability to be of the range of 100 – 1000 (see Clark col 7 line 30). Meeks discloses an active magnetic bearing with a portion of the rotor formed with ferromagnetic laminations (see Meeks col 7 line 7). Garvey discloses that in preferred embodiments of his invention, materials of different magnetic permeabilities and resistivities are distributed within the bearing elements help guide a magnetic flux pattern in the bearing unit (see Garvey paragraph 0042). Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to modify the bearing of Schroeder et al. with a resistivity of 50 ohm meters and a magnetic permeability of 100, in view of Garvey,

Meeks, Clark, and SKF, so as to reduce arc flash damage and to improve upon the passing of high frequency magnetic fields through various parts of the bearing.

Response to Arguments

Applicant's arguments filed 02/17/2009 have been fully considered but they are not persuasive. The examiner acknowledges that Schroeder et al. does not teach magnetic circuits with differing magnetic materials and that there was an error with the first office action regarding claim 1 "the bearing being characterized in that the magnetic circuit... generated in the bearing". This part of the rejection is answered (see Garvey paragraph 0042). The examiner disagrees with applicant regarding applicant's arguments about the Garvey reference. Magnetic flux has a frequency and the Garvey reference teaches that this flux (at a frequency) can be guided by varying the electrical resistivity and permeability (see Garvey paragraph 0042). The examiner has also discovered an error regarding the Garvey reference. The col and lines were from the wrong Garvey reference and all future references to Garvey have been corrected in the following office action.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TERRANCE KENERLY whose telephone number is (571)270-7851. The examiner can normally be reached on Monday through Thursday from 7:30 a.m. to 5:00 p.m. If attempts to reach the examiner by telephone are

unsuccessful, the examiner's supervisor, Scott Geyer can be reached on 571-272-1958. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Terrance Kenerly/
Patent Examiner, Art Unit 4113

/Scott B. Geyer/
Supervisory Patent Examiner, Art Unit 4113